

I claim:

1. A shelter system for use within an environment having air, the shelter system comprising:

5 an enclosure disposeable within the environment and formed of an air impermeable material, the enclosure being configured to define an interior chamber, to contain a quantity of air within the chamber, and to substantially prevent entry of the environment air into the chamber;

10 an oxygen generator disposeable within the enclosure, the oxygen generator including a chemical oxygen generation device for generating oxygen and being configured to discharge oxygen into the enclosure air; and

15 a carbon dioxide removal device disposeable within the enclosure and including an interior chamber and a reactive material disposed within the removal device chamber and configured to remove carbon dioxide from the enclosure air.

2. The shelter system as recited in claim 1 wherein the enclosure is configured to expand from a storage configuration to a deployed configuration and to alternatively contract from the deployed configuration to the storage configuration.

20 3. The shelter system as recited in claim 1 wherein the environment includes a building having a first room and a second room, the enclosure includes a first section disposeable within the first room and a second section connected with the first section and disposeable within the second room, the enclosure chamber extending through the two enclosure sections.

25 4. The shelter system as recited in claim 1 wherein the oxygen generator includes:  
a housing disposeable within the enclosure chamber and having an interior chamber and an opening, the opening extending into the interior chamber and being fluidly connectable with the enclosure chamber; and

30 a quantity of an oxygen-producing material removably disposeable within the housing chamber and configured to generate oxygen by spontaneous chemical reaction, the housing being configured such that the oxygen generated by the material flows from the housing chamber, through the housing opening and into the enclosure chamber.

5. The shelter system as recited in claim 1 wherein the carbon dioxide removal device further includes:

a housing bounding the interior chamber and having an inlet fluidly connecting the enclosure chamber with the removal device chamber and an outlet fluidly connecting the device chamber with the enclosure chamber; and

a fan connected with the housing and configured to initiate flow of a portion of the enclosure air into the inlet, through the reactive material disposed within the removal chamber, out of the outlet and back to enclosure chamber.

6. The shelter system as recited in claim 1 wherein the environment includes a vehicle having an interior chamber and the enclosure is disposed within the vehicle chamber.

7. A shelter for isolating at least one person from an environment having air, the shelter comprising:

an enclosure formed of an air impermeable material and disposeable within the environment, the enclosure being configured to define an interior chamber and being expansible from a storage configuration in which the chamber has a minimum volume to a usage configuration in which the chamber has a maximum volume, the maximum volume being of sufficient magnitude to entirely contain at least one person, the enclosure being further configured to contain a quantity of air within the chamber when disposed in the usage configuration and to at least one of substantially prevent entry of the environment air into the enclosure chamber and substantially prevent egress of enclosure air into the environment.

8. The shelter as recited in claim 7 further comprising an oxygen generator device disposed within the enclosure chamber and configured to generate oxygen and to release the oxygen into the chamber.

9. The shelter as recited in claim 7 wherein the environment includes a building having at least one room and the enclosure is disposeable within the room.

10. The shelter as recited in claim 9 wherein the building includes a first room and a second room, the enclosure includes a first section disposeable within the first room and defining a first chamber section and a second section connected with the first section,

disposeable within the second room and defining a second chamber section, the two chamber sections containing the enclosure air.

11. The shelter as recited in claim 9 wherein the room has at least one generally  
5 vertical wall and a generally horizontal ceiling and the enclosure is removably connectable  
with at least one of the wall and the ceiling so as to support the enclosure in the usage  
configuration.

12. The shelter as recited in claim 7 wherein the environment includes a vehicle having  
10 an interior chamber and the enclosure is disposed within the vehicle chamber.

13. The shelter as recited in claim 7 wherein the enclosure includes a first enclosure  
section disposeable in a first location in the environment, the first enclosure section  
defining a first chamber section, and a second enclosure section disposeable in a second  
15 location in the environment spaced from the first location, the two enclosure sections  
being connected together such that the two chamber sections provide a generally  
continuous enclosure chamber.

14. The shelter as recited in claim 13 wherein the two enclosure sections are  
20 removably connected together.

15. The shelter as recited in claim 7 wherein the enclosure includes at least one  
generally thin and flexible sheet of material formed into a bag.

25 16. The shelter as recited in claim 7 wherein the enclosure has a passage opening sized  
to permit a person to move between the environment and the enclosure chamber and a  
cover configured to substantially seal the opening.

17. The shelter as recited in claim 7 wherein the enclosure includes at least one sheet  
30 of a first flexible material, the first material including a layer of a metallic substance, and  
at least one sheet of a second flexible material, the second material being at least generally  
transparent so as to provide a window.

18. The shelter as recited in claim 7 wherein the enclosure is a residence enclosure and further comprising at least one decontamination enclosure connected with the residence enclosure and defining an interior chamber, the decontamination enclosure having a first opening extending between the decontamination chamber and the environment and a  
5 second opening extending between the decontamination chamber and the residence enclosure chamber.

19. The shelter as recited in claim 18 wherein the decontamination enclosure includes a first cover configured to substantially seal the first opening and a second cover configured  
10 to substantially seal the second opening.

20. The shelter as recited in claim 7 further comprising means for removing carbon dioxide from the enclosure air.

15 21. The shelter as recited in claim 7 further comprising a frame configured to maintain the enclosure disposed in the usage configuration.

22. The shelter as recited in claim 21 wherein the frame is collapseable from a deployed configuration to a storage configuration, the frame supporting the enclosure  
20 when arranged in the deployed configuration.

23. The shelter as recited in claim 21 wherein the enclosure has an interior surface and an exterior surface and the frame is one of contactable with the inner surface and connectable with the exterior surface.

25

24. The shelter as recited in claim 7 wherein:  
the enclosure has a bottom wall, a top wall and at least one sidewall extending between the bottom and top walls; and  
the shelter further comprises at least one support member having an upper end and  
30 a lower end, the lower end being contactable with the enclosure bottom wall and the upper end being contactable with one of the top wall and the side wall, the support being configured to maintain the top wall spaced vertically above the bottom wall to maintain the enclosure disposed in the usage configuration.

25. The shelter as recited in claim 7 wherein the environment includes at least one appliance fixture and the enclosure includes an opening configured to sealing engage about at least a portion of the fixture such that the fixture is usable by a person located within the enclosure while the chamber air substantially isolated from the environment air.

5

26. The shelter as recited in claim 25 wherein the appliance is one of a bathroom shower, a bathroom sink, a bath tub, a toilet and a kitchen sink.

27. A shelter for use within a building, the building containing air and having first and second rooms, each of the two rooms having an interior space, the shelter comprising:  
an enclosure having a first section and a second section connected with the first section, each one of the first and second enclosure sections being formed of a substantially air impermeable material, the first section being disposeable within the first room so as to occupy at least a portion of the first room interior space and defining a first interior chamber section, the second section being disposeable within the second room so as to occupy at least a portion of the second room interior space and defining a second chamber section, the two chamber sections adjoining to form a generally continuous interior chamber for providing habitation for at least one person, the enclosure being configured to contain a quantity of air and to substantially prevent entry of the building air into the enclosure interior chamber.

10  
15  
20

28. The shelter as recited in claim 27 wherein the building includes a passage connecting the first and second rooms and the enclosure further includes a connective section disposeable within the passage, defining an interior chamber section and configured to connect the first and second enclosure sections such the enclosure interior chamber extends generally continuously throughout the two enclosure sections and the connective section.

25

29. The shelter as recited in claim 27 wherein each one of the first and second enclosure sections has an opening and a connective portion extending about the opening, the two connective portions being removably connected so as to connect the two enclosure sections, the two interior chamber sections being adjoined through the two openings.

30

30. The shelter as recited in claim 29 further comprising at least one sealing member disposed about an interface between the two enclosure connective portions and configured to prevent air flow through the enclosure interface.

5. 31. The shelter as recited in claim 27 wherein each one of the enclosure first and second sections is formed of a generally flexible material such that each enclosure section is expansible from a storage configuration in which the enclosure interior chamber section has a minimum volume and a usage configuration in which the enclosure interior chamber section has a maximum volume.

10

32. The shelter as recited in claim 31 wherein:

the enclosure first section is disposeable in the first room and the enclosure second section is disposeable in the second room when the enclosure is disposed in the usage configuration; and

15 the enclosure is disposeable within a single one of the two building rooms when the enclosure is disposed in the storage configuration.

33. The shelter as recited in claim 27 wherein at least one of the two enclosure sections has a passage opening sized to permit a person to move between the environment and the enclosure chamber and a cover configured to substantially seal the opening.

20

34. The shelter as recited in claim 27 wherein each one of the enclosure first and second sections includes a bag formed of at least one generally thin, flexible sheet of material, the two bags being connected together to form the enclosure.

25

35. The shelter as recited in claim 27 wherein the enclosure includes at least one sheet of a first material, the first material including a layer of a metallic substance, and at least one sheet of a second material, the second material being at least generally transparent so as to provide a window.

30

36. The shelter as recited in claim 27 wherein the first room is a closet and the second room is one of a bedroom, a living room, a dining room and a family room.

37. The shelter as recited in claim 27 wherein:

the building has at least two floors, the first room is located on one of the two floors and the second room is located on the other one of the two floors; and

the enclosure is configured such that the first section is disposeable on the one of the two floors while the second enclosure section is disposeable on the other one of the two floors.

38. The shelter as recited in claim 27 further comprising at least one decontamination enclosure connected with the enclosure and bounding an interior space, the decontamination enclosure having a first passage opening extending between the decontamination interior space and an exterior space and a second passage opening extending between the decontamination interior space and one of the two enclosure interior space sections.

39. The shelter as recited in claim 38 wherein the decontamination enclosure includes a first cover configured to substantially seal the first passage opening and a second cover configured to substantially seal the second passage opening.

40. The shelter as recited in claim 27 wherein the enclosure contains a quantity of air and the shelter further comprises means for generating and discharging oxygen into the enclosure chamber and means for removing carbon dioxide from the enclosure air.

41. The shelter as recited in claim 27 wherein the building contains at least one appliance fixture and at least one of the two enclosure sections includes an opening configured to sealing engage about at least a portion of the fixture such that the fixture is usable by a person located within the enclosure chamber while the enclosure air is substantially isolated from the building air.

42. A shelter for isolating at least one person from an environment having air, the shelter system comprising:

a vehicle having an interior chamber;

an enclosure disposed at least partially within the vehicle chamber and formed of a flexible, air impermeable material, the enclosure being configured to define an interior chamber having a volume of a sufficient magnitude to entirely contain at least one person,

the enclosure being further configured to contain a quantity of air within the chamber and to substantially separate the enclosure air from the environment air.

43. The shelter as recited in claim 42 wherein the vehicle is one of an automobile, a sport utility vehicle, a mini van, a van, a bus, a truck, a tractor trailer, an emergency vehicle, an ambulance, an armored transport, a tank, an airplane, a helicopter, a ship, a boat and a submarine.

44. The shelter as recited in claim 42 wherein the enclosure is further configured to substantially prevent entry of the environment air into the enclosure chamber.

45. The shelter as recited in claim 42 wherein the enclosure is further configured to substantially prevent egress of the enclosure air to the environment.

46. The shelter as recited in claim 42 wherein the enclosure includes a first section disposeable within the vehicle chamber and a second section disposeable externally of the vehicle.

47. The shelter as recited in claim 42 wherein the enclosure is expansible from a storage configuration in which the chamber has a minimum volume to a usage configuration in which the chamber has a maximum volume, the enclosure being entirely containable within the vehicle chamber when the enclosure is disposed in the storage configuration.

48. The shelter as recited in claim 47 wherein the chamber has a minimum volume when the enclosure is disposed in the storage configuration and the chamber has a maximum volume when disposed in the usage configuration, the maximum volume having a sufficient magnitude to entirely contain at least one person.

49. The shelter as recited in claim 47 further comprising a frame collapseable from a deployed configuration to a storage configuration, the frame being configured to maintain the enclosure disposed in the usage configuration when the frame is disposed in the deployed configuration.



50. The shelter as recited in claim 47 wherein the vehicle includes an interior surface, the vehicle surface at least partially defining the interior chamber, and the enclosure is connectable with the vehicle surface so as to maintain the enclosure disposed in the usage configuration.

5

51. The shelter as recited in claim 42 further comprising a frame configured to support the enclosure.

10

52. The shelter as recited in claim 42 further comprising means for generating oxygen and means for removing carbon dioxide from the enclosure air.

53. The shelter as recited in claim 42 wherein the enclosure includes a bag formed of at least one sheet of a generally thin, flexible sheet of material.

15

54. The shelter as recited in claim 42 wherein the enclosure is a primary enclosure and the shelter further comprises at least one decontamination enclosure connected with the primary enclosure and defining an interior chamber, the decontamination enclosure having a first passage opening extending between the decontamination chamber and the environment and a second passage opening extending between the decontamination chamber and the primary enclosure chamber.

20

55. The shelter as recited in claim 54 wherein the decontamination enclosure includes a first cover configured to substantially seal the first passage opening and a second cover configured to substantially seal the second passage opening.

25

56. A shelter for isolating at least one person from an environment having air, the shelter comprising:

30

an enclosure disposeable within the environment, configured to define an interior chamber, and being expansible from a storage configuration in which the chamber has a minimum volume to a usage configuration in which the chamber has a maximum volume, the enclosure being further configured to contain a quantity of air within the chamber when disposed in the usage configuration and to substantially prevent entry of the environment air into the enclosure chamber; and

a support configured to maintain the enclosure disposed in the usage configuration.

57. The shelter as recited in claim 56 wherein the enclosure has an interior surface and an exterior surface and the support is one of contactable with the enclosure inner surface and connectable with enclosure exterior surface.

5

58. The shelter as recited in claim 56 wherein the support is a frame formed of a plurality of interconnected elongated members.

59. The shelter as recited in claim 58 wherein the frame is collapseable from a deployed configuration to a storage configuration, the frame being configured to support the enclosure when the frame is arranged in the deployed configuration.

10

60. The shelter as recited in claim 58 wherein the frame is disposeable within the enclosure interior chamber when the frame is arranged in the storage configuration.

15

61. The shelter as recited in claim 56 wherein:

the enclosure has a bottom wall, a top wall and at least one sidewall extending between the bottom and top walls; and

the support includes at least one elongated member having an upper end and a lower end, the lower end being contactable with the enclosure bottom wall and the upper end being contactable with one of the top wall and the side wall so as to maintain the top wall spaced vertically above the bottom wall.

20

62. The shelter as recited in claim 56 wherein the enclosure is formed of an air impermeable material.

25

63. A method of constructing a shelter within a building having at least one room, the room having an interior space, the method comprising:

providing a plurality of sheets of a generally flexible material;  
determining a number of sheets required to enclose a desired portion of the room interior space; and

30

attaching each one of the required number of sheets to at least one of the other sheets so as to form a generally air impermeable enclosure, the enclosure being

disposeable within the desired room portion so as provide an interior chamber isolateable from a remainder of the room interior space.

64. The method as recited in claim 63 wherein the building includes at least first and second rooms and the step of attaching includes forming the enclosure so as to have a first section disposeable within the first room and a second section disposeable within the second room.

65. The method as recited in claim 64 wherein the enclosure first and second sections are removably connected.

66. The method as recited in claim 63 wherein the building further has at least one appliance fixture and the method further comprises the step of providing at least one opening in the enclosure configured to sealingly engage about at least a portion of the appliance fixture such that the appliance fixture is usable by a person disposed within the enclosure.

67. The method as recited in claim 66 wherein the appliance fixture is one of a bathroom shower, a bathroom sink, a toilet and a kitchen sink.

68. The method as recited in claim 63 wherein:  
the step of providing a plurality of sheets includes providing at least one sheet of a light transmissive material; and

the step of attaching includes attaching the light transmissive sheet to at least one other material sheet so as to form a window of the enclosure.

69. The method as recited in claim 63 wherein the building room has an inner surface, the enclosure has an outer surface and the method further comprises the step of providing at least one connector disposed on the enclosure outer surface and configured to connect the enclosure with the room inner surface.

70. The method as recited in claim 63 wherein the step of attaching the sheets includes overlapping sections of each one of two adjacent sheets and fusing together the overlapped sheet sections.

71. The method as recited in claim 63 wherein:  
the room is a first room and the building further has a second room;  
the step of determining the number of sheets includes determining a number of  
5 sheets required to enclose a desired portion of the first room interior space and to enclose a  
desired portion of the second room interior space; and  
the step of attaching the sheets includes forming a first enclosure section  
disposeable within the first room and forming a second enclosure section disposeable  
within the second room, the two enclosure sections being connected together such that the  
10 enclosure interior space extends throughout the two enclosure sections.
72. A shelter for isolating at least one person from an environment having air, the  
shelter system comprising:  
a portable enclosure formed of an air impermeable material and disposeable within  
15 the environment, the enclosure being configured to define an interior chamber, the  
chamber having a volume of a sufficient magnitude to entirely contain at least one person,  
the enclosure being further configured to contain a quantity of air within the chamber and  
to prevent entry of the environment air into the enclosure chamber.
- 20 73. A shelter for isolating at least one person from an environment having air, the  
shelter system comprising:  
an enclosure formed of an air impermeable material and being disposeable within  
the environment, the enclosure being configured to define an interior chamber sized to  
entirely contain at least one person, the enclosure being further configured to contain a  
25 quantity of air within the chamber and to substantially prevent entry of the environment air  
into the enclosure chamber; and  
a connector unit attached to the enclosure and being configured to electrically  
connect an electrical device located within the enclosure chamber with an electrical power  
supply located in the environment, the connector being further configured to substantially  
30 prevent air flow through the connector unit.
74. The shelter as recited in claim 73 wherein the enclosure includes at least one wall  
with an opening and the connector includes a base, the base being disposed one of at least  
partially within the opening and adjacent to the opening and attached to the wall, at least

one opening extending through the base, and at least one electrical line having disposed within the base opening.

75. The shelter as recited in claim 74 wherein the wall opening and the base opening are each sealed so as to substantially prevent air flow through each one of the two openings.

76. The shelter as recited in claim 74 wherein the connector further includes an electrical outlet attached to the base and electrically connected with the electrical line such that at least one electrical device located within the enclosure is engageable with the outlet to connect the device with the power supply.

77. The shelter as recited in claim 74 wherein the electrical line has a first end connected with the electric device and a second end connected with the power supply.

15

78. The shelter as recited in claim 74 wherein the base includes a plurality of openings and the connector includes a plurality of electrical lines, each electrical line having a portion disposed within a separate one of the base openings.

79. The shelter as recited in claim 73 wherein the connector is configured to electrically connect a plurality of electrical devices located within the enclosure with the power supply.

80. The shelter as recited in claim 73 wherein the electrical device is one of a television set, a radio, a computer, a fan, an air conditioner, and an air treatment device.

25

81. The shelter as recited in claim 73 wherein the connector further includes a fluid line fluidly connected with a source of water and configured to permit water to flow into the enclosure chamber.

30

82. The shelter as recited in claim 73 further comprising a first heat exchanger disposed within the enclosure chamber, the first heat exchanger being configured to absorb heat from the enclosure air, and a second heat exchanger disposed in the environment, and wherein the connector further includes at least one fluid line fluidly connected with each

one of the first and second heat exchangers and configured to permit a refrigerant to flow between the first and second heat exchangers.

83. A shelter for isolating at least one person from an environment having air, the  
5 shelter system comprising:

an enclosure formed of an air impermeable material and being disposable within the environment, the enclosure being configured to define an interior chamber sized to entirely contain at least one person, the enclosure being further configured to contain a quantity of air within the chamber and to substantially prevent entry of the environment air  
10 into the enclosure chamber;

a connector unit attached to the enclosure and being configured to fluidly connect a fluid device located within the enclosure chamber with a source of fluid located within the environment, the connector unit being further configured to substantially prevent air flow through the connector unit.

15

84. A shelter for isolating at least one person from an environment having air, the shelter system comprising:

an enclosure formed of an air impermeable material and being disposable within the environment, the enclosure being configured to define an interior chamber sized to entirely contain at least one person, the enclosure being further configured to contain a quantity of air within the chamber and to substantially prevent entry of the environment air  
20 into the enclosure chamber;

a waste receptacle located within the enclosure chamber; and

a connector unit attached to the enclosure and configured to fluidly connect the  
25 receptacle with a depository located in the environment, the connector unit being further configured to substantially prevent air flow through the connector unit.

85. An oxygen generator for providing oxygen to a chamber of an enclosure, the chamber having a volume of a sufficient magnitude so as to entirely contain at least one  
30 person, the oxygen generator comprising:

a housing disposable within the enclosure chamber and having an interior chamber and an opening, the opening extending into the interior chamber and being fluidly connectable with the enclosure chamber; and

a quantity of an oxygen-producing material removably disposeable within the housing chamber and configured to generate oxygen by spontaneous chemical reaction, the housing being configured such that the oxygen generated by the material flows from the housing chamber, through the housing opening and into the enclosure chamber.

5

86. The oxygen generator as recited in claim 85 wherein the enclosure chamber contains air and the oxygen-produce material generates a quantity of oxygen sufficient to maintain a percentage of oxygen within the enclosure air above a minimum value.

10 87. The oxygen generator as recited in claim 85 wherein the oxygen-producing material generates a quantity of oxygen sufficient to support at least one person located within the enclosure chamber for a predetermined period of time.

15 88. The oxygen generator as recited in claim 85 further comprising a supply of oxygen-producing material located externally of the housing chamber, the quantity of oxygen-producing material within the housing chamber being replenishable from the material supply.

20 89. The oxygen generator as recited in claim 88 wherein:  
the enclosure chamber contains air and the oxygen-producing material generates a quantity of oxygen sufficient to maintain a percentage of oxygen within the enclosure air above a minimum value; and

the supply of material has a total mass sufficient to replenish the quantity of oxygen-producing material within the chamber at least predetermined number of times  
25 such that the percentage of oxygen within the enclosure air is maintained above the minimum value for at least a predetermined period of time.

90. The oxygen generator as recited in claim 89 wherein the predetermined period of time is at least seventy hours.

30

91. The oxygen generator as recited in claim 85 wherein the oxygen-producing material is provided as a granular mass of material.

92. The oxygen generator as recited in claim 85 wherein the oxygen-producing material includes at least one of hydrogen peroxide, a source of hydrogen peroxide, a percarbonate salt, a perborate salt, a persulfate, sodium pyrophosphate peroxyhydrate, urea peroxyhydrate, sodium peroxide, a peracid and another organic peroxide, and a source of peracid.

93. The oxygen generator as recited in claim 92 wherein the oxygen-producing material includes sodium percarbonate.

94. The oxygen generator as recited in claim 85 wherein the oxygen-producing material is coated with another material, the coating material being configured to vary a rate of the spontaneous chemical reaction.

95. The oxygen generator as recited in claim 85 further comprising a quantity of a chemical reaction initiating material disposed within the housing chamber, the oxygen-producing material being contactable with the reaction initiating material such that the oxygen-producing material chemically reacts to produce oxygen.

96. The oxygen generator as recited in claim 95 wherein the reaction initiating material is water and the oxygen-producing material is disposeable within the water.

97. The oxygen generator as recited in claim 96 further comprising a catalyst material dissolved in the water and contactable with the oxygen-producing material so as to increase a rate of the chemical reaction of the oxygen-producing material.

98. The oxygen generator as recited in claim 97 wherein the catalyst includes at least one of manganese acetate tetrahydrate, iron-tetra amido macrocyclic ligand, magnesium dioxide, and cellulase.

99. The oxygen generator as recited in claim 85 further comprising a catalyst material disposed within the housing chamber and contactable with the oxygen-producing material so as to increase a rate of the chemical reaction of the oxygen-producing material.



100. The oxygen generator as recited in claim 99 wherein the catalyst includes at least one of manganese acetate tetrahydrate, iron-tetra amido macrocyclic ligand, magnesium dioxide, and cellulase.
- 5 101. The oxygen generator as recited in claim 99 wherein the generator further comprises a quantity of water and the catalyst material is at least one of dissolved within the water and suspended within the water.
- 10 102. The oxygen generator as recited in claim 85 wherein the oxygen-producing material is located within a container removably disposeable within the housing chamber, the container being insertable into the housing chamber to locate the oxygen-producing material within the chamber and alternatively withdrawable from the chamber to remove the material from the housing.
- 15 103. The oxygen generator as recited in claim 85 wherein the housing includes a base wall and an enclosed sidewall having a lower end attached to the base wall and an upper end forming the housing opening, the base wall having an upper surface and the sidewall having an inner circumferential surface, the base wall upper surface and the sidewall inner circumferential surface defining the housing chamber.
- 20 104. The oxygen generator as recited in claim 85 wherein the chemical reaction of the oxygen-producing material produces a waste byproduct, the waste product being removable from the housing when the quantity of oxygen-producing material has reacted so as to evacuate the housing chamber to enable another quantity of oxygen-producing
- 25 material to be disposed within the housing chamber.
105. The oxygen generator as recited in claim 85 wherein the housing includes a generally cylindrical drum.
- 30 106. A method of providing oxygen to a chamber of an enclosure, the chamber having a volume of a sufficient magnitude so as to entirely contain at least one person, the method comprising the steps of:

providing a housing disposeable within the enclosure chamber and having an interior chamber and an opening, the opening extending into the interior chamber and being fluidly connectable with the enclosure chamber;

providing a quantity of an oxygen-producing material configured to generate  
5 oxygen by spontaneous chemical reaction;

providing a chemical reaction initiating material configured to initiate chemical reaction of the oxygen-producing material;

placing the oxygen-producing material into the housing chamber;

placing the chemical reaction initiating material into the housing chamber; and

10 contacting the oxygen-producing material with the chemical reaction initiating material so that the oxygen-producing material chemically reacts and produces oxygen within the housing chamber, the oxygen flowing from the housing chamber, through the housing opening and into the enclosure chamber.

15 107. The method as recited in claim 106 wherein the chemical reaction initiating material includes water and the step of placing the reaction initiating material within the housing includes pouring the water into the housing chamber.

108. The method as recited in claim 107 wherein the step of disposing the oxygen-  
20 initiating material within the housing chamber includes pouring the oxygen-initiating material into the water.

109. The method as recited in claim 106 further comprising the steps of:  
providing a catalyst material configured to increase the rate of chemical reaction of  
25 the oxygen-producing material; and  
placing the catalyst material into the housing chamber such that the catalyst material contacts the oxygen-producing material.

110. The method as recited in claim 109 further comprising the step of mixing the  
30 catalyst material with the chemical reaction initiating material.

111. The method as recited in claim 106 further comprising the steps of:  
providing another quantity of the oxygen-producing material;

disposing the other quantity of oxygen-producing material within the housing after the quantity of oxygen-producing material has reacted.

112. The method as recited in claim 106 further comprising the step of providing a supply of oxygen-producing material and wherein the step of providing the quantity of oxygen-producing material includes removing a portion of the supply of oxygen-producing material.

113. An oxygen generator for providing oxygen to an enclosed room, the room having an interior space, the generator comprising:  
a chemical oxygen generation device configured to generate oxygen; and  
an emitter device having an interior chamber configured to retain oxygen, the oxygen generation device being disposed within the emitter device so as to release oxygen into the chamber, and a discharge port fluidly connected with the chamber and configured to discharge oxygen from the chamber to the room interior space in a generally continuous flow.

114. An emitter device for providing oxygen to an enclosed room using a chemical oxygen generation device, the room having an interior space, emitter device comprising:  
a housing configured to receive the oxygen generation device and having an interior chamber configured to retain oxygen generated by the device; and  
a discharge port fluidly connected with the interior chamber and configured to discharge oxygen from the chamber to the room interior space in a generally continuous flow while the device generates oxygen.

115. An air treatment device for removing carbon dioxide from air contained within a chamber of an enclosure, the enclosure chamber having a volume of sufficient magnitude to entirely contain at least one person, the air treatment device comprising:  
a housing disposeable within the enclosure chamber and having an interior chamber, the chamber being configured to receive a quantity of a reactive material for removing carbon dioxide from air, an inlet port fluidly connecting the housing chamber with the enclosure chamber, and an outlet port fluidly connecting the housing chamber with the enclosure chamber; and

a fan connected with the housing and configured to initiate flow of a portion of the air within the enclosure chamber into the inlet port, through the housing chamber, out of the outlet port and back to the enclosure chamber.

- 5 116. The air treatment device as recited in claim 115 wherein when the reactive material is disposed within the chamber and a portion of the enclosure air flows through the housing chamber, at least a portion of any carbon dioxide within the air flow portion is removed by contact with the reactive material.
- 10 117. The air treatment device as recited in claim 116 wherein a total amount of carbon dioxide within the enclosure air is reduced.
118. The air treatment device as recited in claim 115 wherein the reactive material is a carbon-dioxide absorbent.
- 15 119. The air treatment device as recited in claim 118 wherein the carbon-dioxide absorbent is one of calcium hydroxide, sodium hydroxide and potassium hydroxide.
120. The air treatment device as recited in claim 115 wherein the enclosure includes a flexible bag and the housing is disposeable within the bag.
- 20 121. The air treatment device as recited in claim 120 wherein the fan is an electric-powered fan and the air treatment device further comprises a power supply configured to provide electrical power to the fan.
- 25 122. The air treatment device as recited in claim 121 wherein the power supply includes a battery and at least one electric line operatively connecting the battery with the fan.
- 30 123. The air treatment device as recited in claim 122 further comprising:  
a sensor configured to sense carbon-dioxide within the enclosure air;  
a controller coupled with the sensor, operatively connected with the fan, and configured to operate so as to maintain a level of carbon-dioxide within the air below a predetermined value.

124. The air-treatment device as recited in claim 123 wherein:

the sensor is configured to sense a level of carbon-dioxide within the enclosure air;  
and

the controller is configured to electrically couple the fan with a source of electric  
5 power when the sensed carbon dioxide level is above a predetermined level.

125. The air-treatment device as recited in claim 124 wherein the controller is further  
configured to uncouple the fan from the source of electric power when the sensed carbon  
dioxide level is below a predetermined level.

10

126. The air treatment device as recited in claim 115 further comprising a tube having a  
first end connected with the housing inlet port and a second end fluidly connected with the  
enclosure interior chamber, the fan being disposed within the tube.

15 127. The air treatment device as recited in claim 115 wherein the housing includes a  
generally cylindrical body having a generally horizontal bottom wall, a generally vertically  
tubular side wall extending vertically upwardly from the bottom wall, the tubular side wall  
defining an upper open end providing the second unit outlet port.

20 128. The air treatment device as recited in claim 115 wherein the housing includes a  
generally cylindrical drum.

129. The air treatment device as recited in claim 115 wherein the housing further  
includes a support member disposed within the housing chamber so as to divide the  
25 chamber into an upper chamber section and a lower chamber section, the support member  
having an upper surface for supporting one of the reactive material, a lower surface, and at  
least one flow passage extending between the upper and lower surfaces and fluidly  
connecting the upper and lower chamber sections.

30 130. The air treatment device as recited in claim 129 wherein each support member  
includes a plate having a plurality of through-holes, each through-hole providing a  
separate flow passage.

131. The air treatment device as recited in claim 130 wherein the inlet port is directly fluidly connected with the lower chamber section and the outlet port is directly fluidly connected with the upper chamber section.

- 5 132. An air treatment device for removing carbon dioxide and water from air contained within a chamber of an enclosure, the enclosure chamber having a volume of sufficient magnitude to entirely contain at least one person, the air treatment device comprising:
- 10 a first removal unit disposeable within the enclosure chamber and having an interior chamber, the chamber being configured to receive a quantity of a first reactive material for removing one of carbon dioxide and water from air, an inlet port fluidly connecting the interior chamber with the enclosure chamber, and an outlet port fluidly connected with the interior chamber; and
- a second removal unit disposeable within the enclosure chamber and having an interior chamber, the second unit chamber being configured to receive a quantity of a
- 15 second reactive material for removing the other one of carbon dioxide and water from air, an inlet port fluidly connected with the first unit outlet port and an outlet port fluidly connecting the second unit chamber with the enclosure chamber.

133. The air treatment device as recited in claim 132 wherein when the first reactive
- 20 material is disposed within the first unit chamber, the second reactive material is disposed within the second unit chamber and a portion of the enclosure air flows through the two unit chambers, at least a portion of any carbon dioxide within the air flow portion is removed by one of the two reactive materials and at least a portion of any water within the air flow portion is removed by the other one of the two reactive materials.

25

134. The air treatment device as recited in claim 133 wherein a total amount of carbon dioxide within the enclosure air is reduced and a total amount of water within the enclosure air is reduced.

- 30 135. The air treatment device as recited in claim 133 wherein one of the first and second reactive materials is a desiccant configured to remove water from air and the other one of the first and second materials is a carbon-dioxide absorbent.

136. The air treatment device as recited in claim 135 wherein:

the desiccant is one of calcium chloride, silica gel, calcinated lime, recalcinated lime, and calcium sulfate; and

the carbon-dioxide absorbent is one of calcium hydroxide, sodium hydroxide and pottasium hydroxide.

5

137. The air treatment device as recited in claim 133 wherein the enclosure includes a flexible bag and the first and second units are disposeable within the bag.

10

138. The air treatment device as recited in claim 133 further comprising a fan connected with at least one of the two removal units and configured to initiate flow of a portion of the air within the enclosure chamber into the first unit inlet, through the first and second unit chambers, out of the second unit outlet and back to the enclosure chamber.

15

139. The air treatment device as recited in claim 138 wherein the fan is an electric-powered fan and the air treatment device further comprises a power supply configured to provide electrical power to the fan.

20

140. The air treatment device as recited in claim 139 wherein the power supply includes a battery and at least one electric line operatively connecting the battery with the fan.

25

141. The air treatment device as recited in claim 139 further comprising:  
a sensor configured to sense carbon-dioxide within the enclosure air;  
a controller coupled with the sensor, operatively connected with the fan, and  
configured to operate so as to maintain a level of carbon-dioxide within the air below a  
predetermined value.

30

142. The air-treatment device as recited in claim 141 wherein:  
the sensor is configured to sense a level of carbon-dioxide within the enclosure air;  
and  
the controller is configured to electrically connect the fan with a source of electric  
power when the sensed carbon dioxide level is above a predetermined level.

143. The air-treatment device as recited in claim 142 wherein the controller is further configured to disconnect the fan from the source of electric power when the sensed carbon dioxide level is below a predetermined level.

5 144. The air treatment device as recited in claim 133 further comprising a tube having a first end connected with the first removal unit outlet and a second end connected with the second removal unit inlet such that the tube fluidly connects the first unit chamber and the second unit chamber.

10 145. The air treatment device as recited in claim 144 further comprising a fan disposed within the tube and configured to initiate flow of a portion of the air within the enclosure chamber into the first unit inlet, through the first and second unit chambers, out of the second unit outlet and back to the enclosure chamber.

15 146. The air treatment device as recited in claim 133 wherein each one of the first and second removal units includes a separate housing with a cavity providing the unit interior chamber and an outer surface, each unit inlet port and each unit outlet port extending between the unit housing outer surface and the housing cavity.

20 147. The air treatment device as recited in claim 146 wherein:

the first unit housing includes a generally enclosed cylindrical body having a generally horizontal bottom wall, a top wall spaced vertically from the bottom wall, and a generally vertical tubular side wall extending between the bottom and top walls; and

25 the second unit housing includes a generally cylindrical body having a generally horizontal bottom wall, a generally vertically tubular side wall extending vertically upwardly from the bottom wall, the tubular side wall defining an upper open end providing the second unit outlet port.

30 148. The air treatment device as recited in claim 147 wherein the first unit side wall has an upper end and the top wall includes a plate removably connectable with the side wall upper end.

149. The air treatment device as recited in claim 147 wherein each one of the first and second unit housings includes a generally cylindrical drum.



150. The air treatment device as recited in claim 147 wherein each one of the first and second removal units further includes a separate support member disposed within the unit interior chamber so as to divide the interior chamber into an upper chamber section and a lower chamber section, each support member having an upper surface for supporting one  
5 of the first and second reactive materials, a lower surface, and at least one flow passage extending between the upper and lower surfaces and fluidly connecting the upper and lower chamber sections.

151. The air treatment device as recited in claim 150 wherein each support member  
10 includes a plate having a plurality of through-holes, each through-hole providing a separate flow passage.

152. The air treatment device as recited in claim 150 wherein each one of the first and second unit inlet ports is directly fluidly connected with the unit lower chamber section  
15 and each of the first and second unit outlet ports is directly fluidly connected with the unit upper chamber section.

153. The air treatment device as recited in claim 152 further comprising a tube having a first end connected with the first removal unit outlet and a second end connected with the  
20 second removal unit inlet such that the tube fluidly connects the first unit upper chamber section with the second unit lower chamber section.

154. The air treatment device as recited in claim 133 further comprising a housing having an outer surface, a first interior cavity providing the first unit interior chamber, a  
25 second interior cavity spaced from the first interior cavity and providing the second unit chamber, an interior passage having a first end providing the first unit outlet and a second end providing the second unit inlet, the first unit inlet port extending between the outer surface and the first cavity and the second unit outlet extending between the outer surface and the second cavity.

30

155. The air treatment device as recited in claim 154 wherein the housing includes a lower housing portion providing the first unit chamber and a second housing portion removably disposed upon the lower housing portion and providing the second unit chamber.